Epidemiology of basal cell carcinomas in Blumenau, SC, Brazil, from 1980 to 1999*

*Epidemiologia dos carcinomas basocelulares em Blumenau, SC, Brasil, de 1980 a 1999**

Nilton Nasser[1]

Abstract: BACKGROUND - Morbidity from basal cell carcinomas is increasing worldwide. In Brazil there are no studies about morbidity rates of this type of cancer.
OBJECTIVES - To determine morbidity and to analyze and classify the basal cell carcinomas diagnosed in the city of Blumenau, from 1980 to 1999, according to their major clinical and histological features.
METHODS - The author reviewed the histopathological findings of two laboratories of the city of Blumenau, considering the variables sex, age, primary site and histological type. The morbidity rates were calculated using the number of basal cell carcinomas found and the annual population estimated from 1980 to 1999.
RESULTS - A total of 5254 tumors were identified, with a higher incidence in females and in subjects older than 50 years. Primary site in exposed areas was predominant. Morbidity rates varied from 51.5 cases per 100,000 inhabitants/year in 1980 to 225 cases per 100000 inhabitants in 1999.
CONCLUSIONS - Basal cell carcinomas in Blumenau have distribution patterns similar to those reported in the literature regarding age, anatomical site and histological types. Morbidity rates of this tumor were found in the Brazilian literature.
Keywords: Carcinoma, basal cell/epidemiology; Morbidity; Neoplasms

Resumo: *FUNDAMENTOS - A morbidade dos carcinomas basocelulares da pele vem aumentando no mundo. No Brasil não existem dados sobre coeficientes de morbidade desses cânceres.*
OBJETIVOS - Detectar a morbidade, analisar e classificar os cânceres basocelulares da pele em Blumenau, de 1980 a 1999, segundo as principais características clínicas e histológicas.
MÉTODOS - Utilizaram-se exames histopatológicos oriundos dos laboratórios de Blumenau, revisados quanto às variáveis sexo, idade, localização primária e tipo histológico. Os coeficientes de morbidade anuais foram calculados utilizando o número de casos de neoplasias encontradas e a população anual estimada entre 1980 e 1999.
RESULTADOS - Identificaram-se 5.254 carcinomas basocelulares, com maior freqüência nas mulheres e na faixa etária acima de 50 anos. A localização primária em áreas expostas foi predominante. Os coeficientes de morbidade encontrados variaram entre 51,5 casos por 100.000 habitantes em 1980 e 225 casos por 100.000 habitantes em 1999.
CONCLUSÕES – Os cânceres basocelulares da pele encontrados em Blumenau estão dentro do padrão encontrado na literatura de acordo com a idade, localização anatômica e tipos histológicos. Os coeficientes de morbidade desse tumor são os únicos encontrados na literatura brasileira pesquisada.
Palavras-chave: Carcinoma basocelular/epidemiologia; Morbidade; Neoplasias

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* Work done at Universidade Regional de Blumenau - FURB - Santa Catarina (SC), Brazil.

[1] Ph.D. in Dermatology from the Universidade Federal do Rio de Janeiro; Specialist in Dermatology by the SBD and Full Professor of Dermatology at the Medical School of the Universidade Regional de Blumenau - FURB - Santa Catarina (SC), Brazil.

INTRODUCTION

Basal cell carcinomas are the most common type of skin cancer and account for approximately 70-75% of cases in all statistical studies.[1-5] This study found that 65.7% of all cases diagnosed with skin cancer in the city of Blumenau were basal cell carcinomas.

Morbidity data involving basal cell carcinomas separately are virtually inexistent in the literature for these types of cancer are usually considered together with squamous cell carcinomas and classified as non-melanoma skin cancer.[6]

In the U.S., Scotto[1] found 233 non-melanoma skin cancers/100000 inhabitants/year. The highest records were found in Northern Australia with 1000 to 2000 cases/100000 inhabitants/year.[7-9]

In 1994, in the U.S., approximately 900000 to 1200000 North Americans were expected to present non-melanoma skin cancers.[10]

In this study we aimed to demonstrate the morbidity rates of basal cell carcinoma in the city of Blumenau, from 1980 through 1999, and its main clinical and histological characteristics, considering sex, age, primary site and histological types.

The results represent data which are new for Brazil and may be used as a reference for practically the whole southern region of the country, where the population is predominantly Caucasian and exposed to very intense ultraviolet radiation.

MATERIAL AND METHODS

The morbidity rates of basal cell carcinomas for the city of Blumenau were calculated based on the annual population from 1980 through 1999, estimated by the *Instituto Brasileiro de Geografia e Estatística* (IBGE) [Brazilian Institute of Geography and Statistics],[11] and on a survey of cases histopathologically diagnosed by two local laboratories - Cipac (Laboratório de Citologia, Imunopatologia e Anatomia Patológica) and BML Patologia (Laboratório Beatriz Moreira Leite), from 1980 to 1999. The number of basal cell carcinomas diagnosed within that period was 5254. When the cases were reviewed, only those originating from the city of Blumenau were considered, in order to enhance reliability of morbidity rate calculation. Statistical analysis was performed using association tests and the chi-square test.

RESULTS

A total of 5,254 cases of basal cell carcinomas were diagnosed in the pathology laboratories of the city of Blumenau, SC, corresponding to 65.7% of all skin cancers diagnosed (Table 1).

The distribution of cases by sex was 2571 males (48.9%) and 2683 females (51.1%), as shown in table 1.

Table 2 depicts the percentage distribution of basal cell carcinomas according to age groups and sex, showing that the age group with the highest incidence of this type of carcinoma is 50-69 years.

Table 3 shows the morbidity rates of basal cell carcinomas from 1980 through 1999, and table 4 presents the morbidity rates of this carcinoma by sex.

The percentage of basal cell carcinomas according to their primary site is found in table 5. It can be noted that 46.7% of the cases were found on the face, the total amounting to 81.2% on the head and 18.8% on trunk and limbs.

Table 6 shows the percentage of histological types of basal cell carcinomas found in the study, classified according to Mackie.[12] The superficial spreading type was the most frequent and accounted for 45.3% of cases, and the sclerosing type, which is more invasive and destructive, accounted for 10% of cases.

DISCUSSION

There were 5254 cases of basal cell cancer diagnosed. This is, however, an absolute number that cannot be compared with other absolute numbers found in Brazilian and foreign studies. Therefore, the morbidity rates per 100000 inhabitants/year were calculated, enabling comparisons with other rates reported in the literature, mainly those related to Australia and the United States.[13]

TABLE 1: Numerical and percentage distribution of skin carcinomas according to histological type and sex, in Blumenau, SC, from 1980 to 1999

Histological type	Male	Female	Total	p
Basal cell carcinoma	2,571(48.9%)	2.683(51.1%)	5,254(65.7%)	p>0.05
Squamous cell carcinoma	1,320(60.1%)	875(39.9%)	2,195(27.6%)	p<0.00
Malignant melanoma	235(48.5%)	249(51.5%)	484(6.7%)	p>0.05
Total	4,126(52%)	3.807(48%)	7,933(100%)	

Source: Laboratório de Citologia, Imunopatologia e Anatomia Patológica (Cipac) and Laboratório Beatriz Moreira Leite (BML Patologia).
p: significance level

TABLE 2: Percentage distribution of basal cell carcinomas according to age in Blumenau, SC, Brazil, 1980-1999

Age	Porcentage
0-19	0.3
20-29	1.8
30-39	9
40-49	19.5
50-59	20.1
60-69	24.4
70-79	17.4
80-+	7.5

Source: Laboratório de Citologia, Imunopatologia e Anatomia Patológica (Cipac) and Laboratório Beatriz Moreira Leite (BML Patologia).

TABLE 3: Morbidity rate* of basal cell carcinomas in Blumenau, SC, Brazil, 1980-1999

Year	Rate
1980	51.5
1981	65.2
1982	77.5
1983	79
1984	89.6
1985	113.8
1986	132.8
1987	146.9
1988	132
1989	149.9
1990	145.6
1991	113.6
1992	138.1
1993	147.9
1994	123.2
1995	167.6
1996	132.2
1997	121.5
1998	137.3
1999	225

*per 100000 inhabitants
Source: Laboratório de Citologia, Imunopatologia e Anatomia Patológica (Cipac); Laboratório Beatriz Moreira Leite (BML Patologia) and Instituto Brasileiro de Geografia e Estatística (IBGE).

The morbidity rates help evaluating the increased or decreased incidence of skin cancer; and, in this case, the behavior of basal cell carcinomas in Blumenau over 20 years.

There was a considerable increase in morbidity, from 51.5 cases/100000 inhabitants, in 1980, to 225 cases/100000 inhabitants, in 1999 (Graph 1).

This roughly 430% increase could be explained by the number of diagnoses made in the city, intense solar radiation and the habit of sun exposure

TABLE 4: Morbidity rate* of basal cell carcinomas according to sex, in Blumenau, SC, Brazil, 1980-1999

	Basal cell carcinoma	
Year	Male	Female
1980	54.3	48.7
1981	57	73.2
1982	74	80.8
1983	93	65.5
1984	80.7	98.3
1985	103.1	124.1
1986	125.4	139.9
1987	149.9	144.1
1988	145.9	118.6
1989	150	149.9
1990	147.3	144.1
1991	121.1	106.5
1992	143.3	133.1
1993	138.3	148.8
1994	121.2	125.1
1995	167.9	166.6
1996	133.5	130.9
1997	107.1	135.2
1998	140.1	134.6
1999	227.9	222.2

* per 100000 inhabitants
Source: Laboratório de Citologia, Imunopatologia e Anatomia Patológica (Cipac); Laboratório Beatriz Moreira Leite (BML Patologia) and Instituto Brasileiro de Geografia e Estatística (IBGE).

The highest incidence was among women, representing 51.1% of cases, although the difference cannot be considered significant ($p>0.05$); in the literature the incidence in both sexes is virtually the same.[13-15]

As to age, the highest incidence was in the 40-60 year group, which agrees with other studies.[1,13-15] The primary site of most of the basal cell carcinomas (77.75%) was in exposed areas, like in other statistical surveys.[2,6,15,16]

The incidence of basal cell carcinomas on the ear pinna was higher in men (63.64%) than in women (36.4%), probably due to an important epidemiological factor: the hair length covering the female pinna, with the consequent natural protection against ultraviolet radiation. This difference can be considered statistically significant ($p<0.05$).

Furthermore, a higher incidence was found on the nasal pyramid of women (62.6%) compared to men (37.4%), which is statistically significant ($p<0.05$). The incidence of basal cell carcinomas in lower limbs was higher in females (58.3%) than males (41.67%) and wearing trousers could be con-

TABLE 5: Number and percentage of basal cell carcinomas according to primary site and sex in Blumenau, SC, Brazil, from 1980 to 1999

Primary site	Male No. (%)	Female No. (%)	p
Face	340 (47.89)	370(52.1)	p>0.05
Ear pinna	63 (63.64)	36 (36.4)	p<0.05
Nasal pyramid	92 (37.4)	154 (62.6)	p<0.00
Lips	27 (47.37)	30 (52.6)	p<0.005
Eyebrow	29 (38.16)	47 (61.8)	p<0.05
Scalp and neck	23 (50)	23 (50)	p>0.05
Trunk	94 (55.62)	75 (44.4)	p>0.05
Upper limbs	41 (50.62)	40 (49.4)	p>0.05
Lower limbs	15 (41.67)	21 (58.3)	p>0.05
Total	630	721	

Source: Laboratório de Citologia, Imunopatologia e Anatomia Patológica (Cipac) and Laboratório Beatriz Moreira Leite (BML Patologia).
p: significance level

TABLE 6: Percentage of histological types of basal cell carcinomas in Blumenau, SC, Brazil, from 1980 to 1999

Histological types*	Percentage
Nodular/nodular ulcerative	28.2
Pigmented	16.5
Superficial spreading	45.3
Sclerosing	10

Source: Laboratório de Citologia, Imunopatologia e Anatomia Patológica (Cipac) and Laboratório Beatriz Moreira Leite (BML Patologia).
*Classification according to Mackee PH[12]

sidered an important protection factor for male lower limbs.

As to histology of basal cell carcinomas, the type most frequently found was the superficial spreading, but it is worth mentioning that 10% of cases were of the sclerosing type, which is considered the most aggressive and difficult to treat.[16]

The population studied resides in the city of Blumenau, SC. The majority is Caucasian, of German and Italian (from northern Italy) descent; thus, the skin types most often found were I and II, according to the Fitzpatrick classification.[11-17]

The white race has less melanin pigments than the mulattoes and blacks, therefore being more subject to solar radiation effects.[3-18]

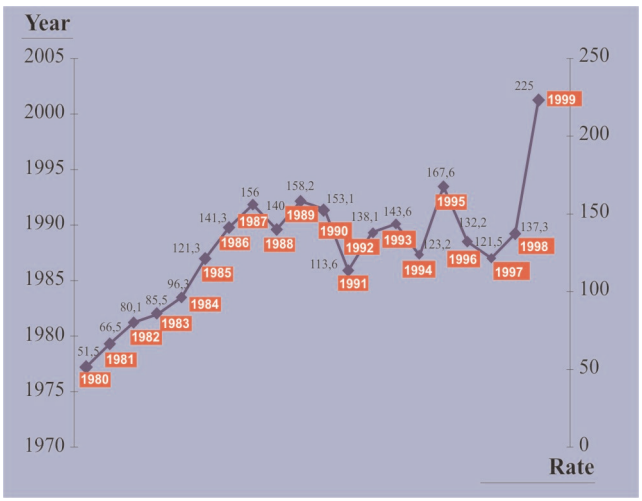
The risk of developing basal cell carcinoma is higher in whites, who have difficulties in becoming tanned, tend to get sunburns, and have fair hair and blue eyes.[2,14,19,20]

Epidemiologic evidence indicates that there is a relationship between excessive sun exposure and the risk of developing skin cancer, especially non-melanoma carcinomas. Ultraviolet radiation is the most important risk factor.[19-21]

The ultraviolet radiation that reaches the population of Blumenau during the summer (Chart 1), measured by the *Instituto Nacional de Pesquisas Espaciais* - Inpe [National Institute of Space Research], shows a UVB-Index of 11.5, which is higher than in Brazilian cities nearer to the Equator (Chart 2) and considered very high according to chart 3.

The higher the UVB radiation, the greater the incidence of skin cancer, and this kind of radiation also depends on the ozone layer that filtrates ultraviolet radiation (Chart 2).[21-23]

The ozone layer in the region of Blumenau can



GRAPH 1: Morbidity rate of basal cell carcinomas, 1980-1999, Blumenau, SC, Brazil

CHART 1: UVB-Index in Brazil, summer and winter, 1999

Cities	UVB-Index summer	UVB-Index winter	Latitude
Natal	8.7	9	05°47'42"
Salvador	9.8	8.5	12°58'16"
Belo Horizonte	11.5	7	19°55'15"
Rio de Janeiro	11.9	4.5	22°54'10"
São Paulo	11.8	3.9	23°32'51"
Blumenau	11.5	3.5	26°65'55"
Porto Alegre	9.5	5	30°01'59"

Source: Instituto Nacional de Pesquisas Espaciais (Inpe)

CHART 2: Measures of ozone layer thickness over Brazilian cities, 1999

Cities	October 1997	October 1998	October 1999
Porto Alegre	275	298	284
Blumenau	266	281	269
Curitiba	260	282	271
São Paulo	256	301	272
Rio de Janeiro	253	306	273
Natal	275	285	284
Brasília	257	280	257
Belém	270	291	288

Source: Environmental Protection Agency/Operational Satellites NOAA (EPA/NOAA). Experimental UVB-Index. Satellite Nimbus-Nasa

Brazilian localities with latitudes closer to the Equator, while it actually should be more concentrated (Chart 3) since the ozone layer decreases from the poles toward this line.[22,23]

CONCLUSION

In a sample of 5254 basal cell carcinomas diagnosed over a 20-year period and with annually determined morbidity rates, it was found that there was a progressive increase in these rates from 1980 to 1990 (430%), with a slight predominance in women (51%).

The highest incidence was found in the population aged over 40 (88.9%), with a significant presence under this age.

The primary site was predominant in exposed areas, and the most common histological type found was superficial spreading basal cell carcinoma (45.3%).

The increased ultraviolet radiation due to reduced ozone layer concentration over the Blumenau region could be included among the main factors contributing to the increase in basal cell carcinomas.

Based on the data found in this study, it can be concluded that the white population of Blumenau with phototypes I and II and exposed to intense sun radiation is at great risk of developing basal cell carcinoma.

Basal cell carcinomas constitute a major public health problem in this city, requiring health education programs for all age groups as of childhood, aimed at prevention, photoprotection and adequate conditions for early diagnosis and treatment of the disease, thus preventing greater damage that could be caused by this kind of skin cancer. ❑

CHART 3: UVB-Index intensity

Intensity	UVB-INDEX
Minimum	0 - 2
Low	3 - 4
Moderate	5 - 6
High	7 - 9
Very high	10 - 15

Source: Environmental Protection Agency/Operational Satellites NOAA (EPA/NOAA). Experimental UVB-Index

REFERENCES

1. Scotto J, Fears TR and Fraumeni JF, Jr: Incidence of Nonmelanoma Skin Cancer in the United States. NCI NIH Publ. No. 83-2433, 1983.
2. Wingo PA, Tong T. Cancer statistics. C A Cancer J Clin. 1995; 45:12-3.
3. Silverstone H, Searle JHA. The epidemiology of skin cancer in Queensland: the influence of phenotype and environment. Br J Cancer. 1970;24:235-52.
4. Scotto J, Kopf AW, Urbach F. Non-melanoma skin cancer in four areas of the U.S. Cancer. 1974:1331-8.
5. Nasser N. Incidência de câncer de pele em Blumenau-SC (1980-1990). An Bras Dermatol. 1993; 68:77-8.
6. Weinstock MA. Ultraviolet radiation and skin cancer: epi demiologic data from the United States and Canada. In: Young AR, Bjorn LO, Moan J, editors. Environmental UV photobiology. New York: Plenum Press; 1993. p. 295-344.
7. Kricker A, English DR, Randell PL, Heenan PJ, Clay CD, Delaney TA, et al. Skin cancer in Geraldton, Western Australia: a survey of incidence and prevalence. Med J Aust. 1990; 152:399-407.
8. Green A, Battistutta D. Incidence and determinants of skin cancer in a high-risk Australian population. Int J Cancer. 1990; 46:356-61.
9. Stenbeck KD, Balanda KP, Williams MJ, Ring IT, MacLennan R, Chick JE, et al. Patterns of treated non-melanoma skin cancer in Queensland - the region with the highest incidence rates in the world. Med J Aust. 1990; 153:511-5.
10. Boring CC, Squires TS, Tong T. Cancer statistics, 1993. CA Cancer J Clin. 1993; 43:7-26.
11. BRASIL. Instituto Brasileiro de Geografia e Estatística. Estimativas para as Unidades da Federação obtidas pela Metodologia AiBi, controlada pela projeção Brasil - Revisão 2000 (método dos componentes demográficos). Brasília; 2004.
12. Mackee, PH. Pathology of the skin. 2th ed. London: Mosby-Wolse; 1996.
13. Weinstock MA. Epidemiology of non-melanoma skin cancer: Clinical issues, definitions, and classification. J Invest Dermatol. 1994; 102:4S-5S.
14. Karagas MR. Occurrence of cutaneous basal cell and squamous cell malignancies among those with a prior history of skin cancer. J Invest Dermatol. 1994; 102:10S-3S.
15. Vitaliano PP, Urbach F. The relative importance of risk factors in nom-melanoma carcinoma. Arch Dermatol. 1980; 116:454-6.
16. Sampaio, SAP, Castro, RM, Rivitti E. Dermatologia Básica. São Paulo: Artes Médicas; 1985.
17. Fritzpatrick TB. The validity and practicality of sun reactive skin types I through VI. Arch Dermatol. 1988; 124: 869-71.
18. Urbach F, Rose DB, Bonnem RDH. Genetic and environmental interactions in skin carcinogenesis. In: Environment and cancer. Baltimore: Williams & Wilkins; 1972. p.355-71.
19. MacKie, R. M., Elwood, J. M. and Hawk, J. L. M. Links between exposure to ultraviolet radiation and skin cancer: a report of the Royal College of Physicians. J R Coll Physic London. 1987; 21: 91-6.
20. Karagas MR, Stukel TA, Greenberg ER, Baron JA, Mott LA, Stern RS. Risk of subsequent basal cell cancer and squamous cell cancer of the skin among patients with prior skin cancer. JAMA. 1992; 267:3305-10.
21. Moan J, Dahlback A, Henriksen T, Magnus K. Biological amplification factor for sunlight induced non-melanoma skin cancer at high latitudes. Cancer Res. 1989; 49:5207-12.
22. World Health Orgnization Geneva: 1994. International Programme on Chemical Safety. Environmental health criteria 160 ultraviolet radiation.[cited 2004 nov] Available from: http://www.inchem.org/documents/ehc/ehc/ehc160.htm.
23. Department of the Environment Protection: 2004. Stratospheric ozone depletion and its possible impacts in the UK [cited 2004 Nov]. Available from: http://www.defra.gov.uk/environment/statistics/globatmos/gaozdep.htm

MAILING ADDRESS:
Nilton Nasser
Rua Curt Hering, 20 - 3º Andar - Centro
89010-030 - Blumenau - SC
Tel./fax: +55 47 322-3143
E-mail: ninasser.bnu@terra.com.br